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ABSTRACT

The role of the information center in the National Program for Library and Information Services is projected. The various types of information centers are identified and defined, and the generation, processing, communication, and use of information and knowledge are reviewed. A plan is given for the integration of existing information centers into the national program, including operational and qualitative standards for participation. After an analysis of problems that might arise and suggested solutions, the benefits that might be derived from the presence of an information center constituency in the national program are indicated. A chart comparing the functions of the major systems of information services and diagrams of the processes of information transfer are appended. (Author/PF)

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NATIONAL COMMISSION ON LIBRARIES AND INFORMATION SCIENCE
NATIONAL PROGRAM FOR LIBRARY
AND INFORMATION SERVICES

RELATED PAPER
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THE ROLE OF THE INFORMATION CENTER IN THE NATIONAL COMMISSION ON LIBRARIES AND INFORMATION SCIENCE PROGRAM FOR THE IMPROVEMENT OF NATIONAL INFORMATION SERVICES

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Describes the relationship and involvement of the information centers with the national program as described in the second draft of the NCLIS program document. Projects the role and prospective benefits the information centers have in relating its program to such a national program, projects the types of standards the information center required to meet to join the National program, anticipates problems in developing this relationship, and suggests solutions.

NOVEMBER, 1974

The views expressed are those of the author and do not necessarily reflect the position or policy of the NCLIS. Though related to the Commission's National Program, papers in this series are not an integral part of the National Program Document.

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THE ROLE OF THE INFORMATION CENTER IN THE NATIONAL COMMISSION ON LIBRARIES AND INFORMATION SCIENCE PROGRAM FOR THE IMPROVEMENT OF NATIONAL INFORMATION SERVICES

INTRODUCTION

Some observers have noted that we live in a turbulent, fragmented societal setting, with great contrasts in values, goals, life styles, and opportunities. The times carry the potential and often the actuality of social and natural crises and disasters. Coping with this turbulence will depend in part on the use of information; and correlatively, the tumult depends in part on the misuse of information. Salvation, some observers believe, lies in optimizing the ratio of knowledge generated to the information generated. Wise decisions depend, certainly, on adequate knowledge.

In this paper I will discuss the information center -- a mechanism that has evolved over the years to synthesize knowledge from information -- and will show its relationship to and enhancement of the NCLIS National Program for Library and Information Services. To do this, it will be necessary for me to identify and define the various types of information centers. Then, in order to provide a better understanding of the role information centers can play in the NCLIS program, I will have to examine how information and knowledge are generated, processed, communicated, and used. Such a review, I believe, will demonstrate the particular effectiveness of the

information center mechanism in processing and communicating information and knowledge. Next, I will consider how existing information centers and other information systems might be integrated into the national program and discuss standards for participation. Problems that might be anticipated in developing an information center component will then be examined and some suggested solutions will be offered. Finally, I will indicate the benefits that might be derived from an information center constituency in the proposed NCLIS program.

DEFINITIONS

What sort of organizational creature is the information center? A precise definition is difficult, because an information center means different things to different people. To best explain it I shall first have to define "information", "knowledge", "information system", "information services" and other related terms.

Information is a generic term, having a number of subsets. Most dictionaries define information as knowledge, intelligence, facts, figures, news, or data which can be used, transferred, or communicated. The longest-lived, most persistent sort of information is called knowledge. Knowledge is the result of an act or state of understanding. It is the clear perception or learning gained through experience and through ruminative cognition and discernment. The term, data, is often defined as raw facts. Most information originates in this context, as undigested data. In science and

technology, data are characterized by their tendency toward quantification. Quantified data intellectually processed become information and produce knowledge.

An explication of the term information center requires a few more definitions. A system is an arrangement of parts or elements working together to perform a set of operations for accomplishing the purpose of the whole. Services are a system of activities and materials used to accomplish some regular work or accommodation for the user. The term, information system, refers to the methods, materials, media, producers, and users involved in an organized way to transfer information within a specific organization, activity or field. Information Services is the term given to the system of resources, personnel, activities, and materials for providing specific users with data, information, counsel, documentation, or documents.

Now, a library is a type of information system. It is a collection of documents -- books, films, magazines, maps, microforms, audiovisual material, computer tapes, etc. -- organized and maintained for a system of services, mainly for reference and study. A special library is one whose collection is restricted to a specific scope; it offers a greater range of services based on its specialized collection. (See Table I). Libraries, probably, are as old as the written word. The first libraries, established in the Near East about 3500 BC, were repositories of clay tablets or papyrus scrolls that recorded such information as vital statistics, boundaries

of land, meteorological phenomena, or political and historical events -- documents predating literary works. A significant part of their information dealt with the science and technology of the time -- eclipses of the sun or the proper method of brewing beer, for example. The early librarians were scholars and subject specialists, providing expertise in their information services. Those early library resources and system of operations were precursors of the present day information analysis center.

Since the end of World War II, many other systems of information services have been evolving. Among these are documentation centers, information centers, clearinghouses, referral centers, publication sales services, information exchanges, and information analysis centers. Some of these, besides performing the library functions of collecting, cataloguing, and circulating documents, also generate, publish and disseminate information. There is considerable overlap and duplication of functions among these systems.

A documentation center is a depository for documents; its purpose is not archival but distributive. Its functions are outlined in the accompanying Table I. A clearinghouse is also a depository for documents, with the additional mission of serving as a central agency for collection, classification, and distribution of information. The clearinghouse also includes such functions as collecting and maintaining records of who is doing what, where, when and how -- an especially valuable service for researchers. Substantive questions about items in these records are referred to the source.

So the clearinghouse may also serve as a referral center. For example, the Smithsonian Science Information Exchange serves as a clearinghouse of research in progress;* the National Referral Center of the Library of Congress provides referral to experts within the field of an inquiry; it does not supply information or documents. The National Technical Information Service combines the functions of a document center with those of a clearinghouse, and a referral center. It performs a number of other services: publishing and reproduction of documents; sales and distribution of documents; billing services for other information centers; translation; alerting services; distribution of patent documents and computer tapes are among its functions. The Defense Documentation Center (DDC) is a depository of classified and unclassified reports and other documents produced by the Defense Department and its contractors. It also serves as a referral center for identifying experts in various fields. Users of DDC are in the defense community. The sixteen Educational Resources Information Centers (ERIC) have the word "clearinghouse" in their names, for example, ERIC Clearinghouse on Teacher Education. The ERIC centers combine information center and analysis center activities with

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*The term, exchange, is often found in information activities; it has been borrowed from the context of the central office in which telephone lines are connected to permit communication. The "invisible college" is an example of an effective information exchange.

clearinghouse functions. Advances in information technology have created a new type of services operation -- the communication center -- which provides electronic and/or computer-to-computer links. The communication center offers terminal-to-data-file linkage services, as well as other types of data and information processing, for example, duplication of graphical material.

Now, let us examine the information center concept. A neat, rigorous definition offers problems because the concept has been changing. Various types of information services units in organizations are frequently called information centers. The "information explosion", which followed the tremendous increase in physical, biological, social and in engineering research activities after World War II, stepped up demands for expanded, more efficient, and better-integrated information services. The trend has been to unify library, patent, translation, report writing, archival, abstracting, literature research, editorial, communications, and publications activities within a single organizational unit. The organization created by the centralization of all, some, or only two or three of these activities has received the appelation of information center. Some information centers offer additional services such as replies to queries, retrospective searches, selective dissemination of information and the conducting of seminars and conferences.

The information analysis center is a very recent term but the concept is as old as human culture. The concept is considered an inherent universal in human behavior, responsible for man's progress

from primeval cave to his flights into space. Some have seen the concept operating in the monoliths of Stonehenge, in the medicine men of primitive tribes, in the Oracle at Delphi, in the monasteries during the Dark Ages, and in the universities that flowered in the Renaissance. Every human being functions at times like an information analysis center when he (or she) analyzes a problematic situation, formulates his problem, seeks out the relevant information, and marshals the pertinent knowledge to solve his problem. The information analysis center has become a contemporary institutional mechanism with the responsibility for systematically gathering everything known about a particular field or subject, organizing the acquired information, indexing and storing it so that it can be retrieved readily, and digesting, evaluating, and synthesizing the information so that new insight or knowledge is created. A COSATI panel provided these essential criteria as characterizing an information analysis center:

Key activities must include the analysis, interpretation, synthesis, evaluation, and repackaging of the information for the purpose of helping users better to assimilate the information.

Subject specialists must perform the analysis and interpretation.

New, evaluated information must be produced in the form of critical reviews, state-of-the-art monographs; and substantive evaluated responses to inquiries be forwarded rather than list of references.

Assistance must be provided to a community of users and not

just to "in-house" personnel.

Let us now examine Table I. It completes and compares the definitions of the major systems of information services." This table presents a descriptive overview and comparative summary of the functions, services, and products. That there is a continuum in function is not necessarily implied. While there are duplication and overlap in functions, services and products, the word analysis is the critical characteristic which distinguishes the system in the far right column from the others.

HOW INFORMATION/KNOWLEDGE IS USED

Now that I have defined the information center and its various subsets, it might be well for us to examine how information is generated, communicated and used. Such an understanding will be helpful in considering the role information centers can play in helping the national program to provide improved information services. We might call the process of provision of information services an information system. Just previously, I indicated that the term, information system, referred to methods, materials, media, the generators and users involved to effect information transfer. In general, the system consists of a complex collection of information "messages", of persons who produce them, institutions which process them and of a set of behavior patterns, customs, and traditions by which these persons and institutions interrelate. To provide a better understanding of how the system functions, I shall diagram aspects of its operation.

Figure 1. shows the basic system of information transfer.

It is a highly simplified schematic of what occurs. In the complexities of our times, it is rare that a generator of a piece of information interacts so directly with a user who in turn assimilates the information received and generates new information or knowledge which is sent back to the original generator. Information must pass barriers of distance, discipline, repeated handling, media channels, proprietary rights, language, social, psychological and political boundaries. Though direct communication between generator and user is desirable and effective, direct channels usually are impractical. Communication between generator and user is multichanneled as is shown in Figure 2. Factors adding complexity are the increased volume of information and the increased number of potential users of the information. Channels of communication often become clogged with information. What gets through may be relevant to only a small percentage of users. The user cannot find time to read the many papers, journals, and books related to his interest; not only may he be overwhelmed by the sheer volume in his own language, but also he may face the language barrier of foreign material, as well as the problem of its inaccessibility. Adding to these frustrations is the frequent difficulty that the material contains contradictory, incomplete and erroneous information. Users, therefore, are turning more and more to intermediary resources -- special libraries, information services, and analysis centers for convenient usable and reliable information. Figure 3 diagrams various intermediaries between the Generators and Users of information.

There is much greater complexity inherent in the information system than is apparent in the shorthand representations in Figure 1 - 3. The box labeled generator may symbolize one individual, but in actuality, usable information and knowledge are more likely to have several or even hundreds of generators as suggested in Figure 4, and a "chunk" of crystallized knowledge may have thousands of users as shown in Figure 5.

Further, information undergoes a number of transformational processes from point of generation to dissemination to utilization as diagramed in Figures 6 and 7.

The mechanisms for information movement from generator to user, diagramed in Figure 6, may include immediate direct face to face communication or long term retrieval by way of archival storage mechanisms, or may vary from publication of full text in a primary journal to presentation in various filtered, abstracted, or analyzed and evaluated fragments.

Figure 7 details steps in the transfer process. At any point in the alternatives diagramed in Figure 6, after generation of the information -- be it the record of the conversation between the researcher/author and the user of the primary publication source -- the paper recording the information is accessioned, entered into the system (library, clearinghouse, information services or center), catalogued, classified, and indexed. It is entered into the information store -- the paper placed on an appropriate shelf, file drawer or computer tape and the index record filed.

Retrieval and dissemination of the information in the paper may originate by a query or request, or may be built into the routine of the system through a selective dissemination of information (SDI) procedure wherein subscribers with pertinent interest profiles receive extracts or abstracts of the information. Current awareness bulletins carrying an abstract or extract of the papers are distributed to subscriber-users of such a system. Hard copies, microfilms, or data from a table are made available. Translations from or into another language may be part of the available services. The information analysis center intellectually filters the information in the paper -- evaluates it, synthesizes it, analyzes it, condenses it, and frequently repackages it, making the information accessible and usable.

The final step in the information flow is the utilization of the information or knowledge by its community of users. It becomes the basis for starting the feedback loop diagramed in Figure 1. Figure 8 is a redrawing of the basic information system shown in Figure 1, summarizing the processes diagramed in the intervening figures. Notice that the flow of operation of the various components is not linear.

We might examine the component subsystems. The Generation of Facts and Ideas Subsystem represents the complex of activities involved in the observation and collection of information. It begins with the observation of phenomena in the environment and then relates them to known facts and ideas (knowledge) or vice versa. The activity is both intellectual and empirical.

The Encoding-Processing Subsystem includes the intellectual and manual effort involved in encoding the observations or knowledge generated in the previous subsystem into a communicable message or document.

The Analysis Subsystem represents the several analytical activities associated with the processing of the message document for storage and retrieval, for its critical evaluation, and for the various alternatives of repackaging. Involved are the schemes for the information's classification and indexing procedures and for its abstracting, translation, correlation, or for its critical evaluation, repackaged in a communicable format.

The Communication Subsystem represents the media or transmitting channels of the message or document. (It was illustrated in Figure 2).

The Storage and Retrieval Subsystem involves: 1) The intellectual scheme for organizing the information into an index file and into the store, as well as the device or equipment for receiving and holding the information; and 2) the techniques for searching the index file, document or information collection, as well as the mechanism enabling the recovery of the document or information it contains.

The User Subsystem includes the intended recipient, audience, or beneficiary of the message/document or of any of its data, information, or knowledge.

The Facts and Ideas Subsystem is the communicable insight, data, information, or knowledge generated, observed, induced,

deduced, or perceived by the Generation Subsystem or by the User Subsystem.

Figure 8 is a model of a generalized information system. Most systems follow this framework with an additional, but essential component--control. Dictionaries define control as direction, guidance, or restraining power which a person, institution, or mechanism exercises over an activity or system.

Control includes planning, adjustment, and correction of functions in order to achieve ends or objectives. Within the generalized models of Figures 1 and 8 is the suggestion of control in the feedback loop which connects the "output" side with the "input", (the influence of the use of information on the generation of information). The function of a feedback control subsystem is to enable the information system to react immediately to demands and requirements on it.

In the working of an information system, control takes the form of management policy and operational procedures and rules by which the transforming of information is guided, as well as a conscious and directed effort to monitor the workings of the component subsystems. Figure 8 might then be redrawn (Figure 9) to show the component which maintains and controls the subsystems which bring the generators and users of information together in an integrated, unified information system.

This completes our review of the conceptual framework of the information system. The examination has shown the information center to be an effective system for transferring information, knowledge and

understanding. Properly mobilized, the information center can be an important component in the NCLIS program for meeting the information needs of our "complex and swiftly changing society".

A PROGRAM FOR MOBILIZING THE INFORMATION CENTER RESOURCE

How can the information center resource be mobilized and integrated with the NCLIS program? A national program with the goals articulated by the NCLIS is an incentive for action. Its objectives are to weld together the tremendous information resources of the nation into a coherent whole and to develop an integrated complex of information services. The philosophy behind such integration is cooperative, Voluntary action rather than prescription. The NCLIS has neither aspirations for operational authority nor desires for such responsibility. Participation in such a network has a number of persuasive inducements for an information system. From a subjective level, there is a certain excitement and gratification in partaking in the development, design and implementation of a national program. On a more objective level, there are the benefits of greater visibility, cost and resource sharing, establishment of quality and compatibility standards, as well as possible financial support.

Mobilization will depend first on widening the usage of the extensive number of existing information centers -- within Federal, state, academic and the private sectors -- and second, on developing new centers in areas of U.S. society especially lacking in information resources. The program to accomplish this will require survey

techniques for identifying the existing and potential information centers and for inventorying their resources, scope and expertise, their missions, functions, services and products; their user populations, and their constraints.

A number of national, Federal information center networks, some more advanced than others, should be considered. Among them are:

1) The National Standard Reference Data System -- a decentralized network of about 24 data and information analysis centers under the purview of the National Bureau of Standards, but located not only at Federal laboratories but also at academic institutions and in private industry, with the mission of making available critically evaluated data on the physical and chemical properties of substances.
2) U.S. Atomic Energy Commission information analysis centers*-- a network of about 25 information analysis centers (a few also are part of the NSRDS network) with the mission of making available critically evaluated data and information in the nuclear field.
3) The Department of Defense information analysis centers -- a network of about 18 centers with the mission of developing and disseminating defense related information and data.

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*These are now within the newly created Energy Research and Development Administration (ERDA).

4) The National Institutes of Health network of about ten centers aimed at developing and disseminating information on health related matters.

5) The Educational Resources Information Centers (ERIC) of the National Institute of Educuation -- a network of 16 centers and clearinghouses concerned with categorical matters related to education.

6) The National Aeronautics and Space Administration's (NASA) Technology Transfer Network of centers, concerned with disseminating to American industry technological developments from NASA sponsored activities.

7) Regional information dissemination centers of various Federal departments and agencies, some among which are:

   a) The Department of Agriculture's Extension Service and county agents.

   b) The Department of Commerce Field Offices.

   c) The National Weather Service field offices.

   d) The General Services Administration's Federal Information Centers.

   e) The Federal Archives and Records (Regional) Centers

   f) The Food and Drug Administration's field offices.

   g) The Department of Housing and Urban Development's regional offices.

   h) The U.S. Geological Survey's regional offices.

   i) The National Labor Relations Board's regional offices.

   j) The Small Business Administration's regional offices.

   k) The Federal Aviation Administration's regional offices.

   l) The Water Resources Scientific Information Center Network

8) There are many state and local information centers as for example:

   a) Iowa (State) Department of Health, Division of Vital Statistics Information Center.

   b) Community Council of Greater New York, Information Bureau and Contributor's Information Bureau.

   c) Potomac Basin Center, Washington, D.C.

9) Battelle Memorial Institute operates a number of information centers for the Federal government and the private sector.

10) In the private sector, there are professional, trade, and profit making organizations operating information centers, as for example:

   a) Scientists' Institute for Public Information.

   b) National League of Cities.

   c) Chemical Specialties Manufacturers Association.

11) There are also for-profit information systems operating centers as for example:

   a) Dodge Information System, covering the construction industry.

   b) Information for Business, offering advisory information on business matters.

   c) Business International, offering management information to corporations and others doing business across international borders.

   d) Information Handling Services, offering product and Specification data.

12. The Government-Industry Data Exchange Program -- a cooperative activity between Government and Industry which exchanges knowledge related to engineering data, failure rate data, failure experience, and metrology data.

The above listing is indicative of the vast number of existing centers that are potential sources for cooptation. A number of directories are available to help identify and survey other information centers for possible participation; among which:

1) The National Referral Center has six directories.
   a) Directory of Federally Supported Information Analysis Centers.
   b) A Directory of Information Resources in the United States, Federal Government.
   c) A Directory of Information Resources in the United States, Social Sciences.
   d) A Directory of Information Resources in the United States, Biological Science.
   e) A Directory of Information Resources in the United States, Physical Sciences, Engineering.
   f) A Directory of Information Resources in the United States, General Toxicology.
   g) A Directory of Information Resources in the United States, Water.
2) Gale Directory of Special Libraries and Information Centers.
3) NFEC (National Foundation for Environmental Control) Directory of Environmental Information Resources.
4) NASA Directory of Aerospace Safety Specialized Information Sources.

Not included in my listing but essential to any consideration

for developing a national network of information centers are numerous libraries, conventional and special. These systems are an important resource of information services -- often the only source in many communities. In many areas of dire information needs, libraries could be an important nucleus for development of centers.

Just a perusal of the above listing of information center networks reveals that they exist in subject areas of intense interest, mainly those consonant with national goals and requirements, as for example defense materials, atomic energy, space sciences, education, and health. Because information centers -- especially information analysis centers -- are expensive to operate, experience has shown that as national priorities (as seen by their sponsors, but not necessarily by their user communities) change, many lose their financial support and are forced to reduce their scope and services or cease operation altogether. Most are mission oriented, created to serve a specific user group involved in a specific mission. Outside users are usually not turned away but are not encouraged to partake of the services. This is particulary characteristic of information analysis centers who operate within laboratory settings. Information analysis centers are closely associated with and are considered integral to successful research and development. As a research and development effort is reduced or eliminated, the pertinent information analysis center is also reduced or eliminated, despite any desire to the contrary by the user community served by the center. The National Program might offer centers opportunities

for greater stability. Of course, when the contributions of a center no longer justify expenditures, the center deserves dis-establishment.

A more difficult task -- but one amenable to social science survey -- will be the identification of the U.S. national information needs that best can be met by information center activity. Details on the methodology of the surveys are not within the scope of this paper, but the studies would determine not only who needs what, why, when, and how, but also would assess the criticality of that need, subject to the constraints operating in the National program.

There are many constituencies of users now deprived of information resources, for example: the blind and other handicapped; indigent and disfranchised groups; minorities; residents in pockets of poverty in urban centers like Watts, California, or in rural areas like Appalachia, whose survival and well-being would profit by information resources directed to their special needs. The operation of present information center networks are geared to help the "information-haves" but not the "information-have-nots". With support from the National Program a number of existing information analysis centers and networks could open their services to wider user communities, but I cannot forsee the information have-nots benefiting to any great extent from a more open policy of existing information analysis centers, mostly because the subject matter is not appropriate to and is beyond the needs and capabilities of

practical use of the have-nots. Moreover, both the have-nots and the centers are naive in the means for interacting with one another. Nonetheless, large segments of this nation could benefit from the resources presently available if a mechanism of accessibility and interaction were present. I am referring to matters like energy, food, housing, health, education, economics, and small business, in particular.

The rationalization for the matching of what information centers and systems are available with what are needed will depend on consideration and integration of the following elements:

1) Existing information networks and centers appropriate for participation in the National Program and their constraints.
2) Factors and traditions within the subject matter of the information centers.
3) The user communities and their needs, as well as their readiness to be served.
4) The prevailing socio-economic-political constraints.
5) Available physical and personnel resources.
6) The state-of-the-art-of information science/technology, as well as its patterns and traditions.
7) Budgetory considerations.
8) Integration and coordination constraints of the NCLIS/ New Agency.

GENERAL GUIDEPOSTS FOR IMPLEMENTATION OF COOPTED NCLIS INFORMATION CENTERS

An information center's reason for existence is the use to which it is put; the user, therefore, is the most important element in the information cycle. A center's ability to satisfy the needs of its community of users is the guage of its worth. Information needs, hungers, and uses vary with user communities. What services are offered depend not only on the nature and needs of the community but also on the mission and capabilities of the center. Coopting of an existing center or development of a new one would require examination of answers to questions like the following:

1. User Community

   What is the nature of the community to be served by the center?

   Is the community distinct, visible, homogeneous, stable, transient?

   Are there individual differences in its socio-economic character, in members' personal health, attitudes, education, outlook, etc. that will influence the type of service required?

   Are there individuals or components within the community whose needs should receive a higher priority?

   Is the user community ready to be served?

2. Information Requirements

   What information does the community use or need?

   Where does it obtain it now?

   How well do the available sources meet the information needs?

Is the information timely, complete, valid, readily available? At what costs?

3. Interest in and Need for the Center

Is there an interest within the community for the center?

Would the center be responsive to the community's needs?

How would the center contribute to the welfare of the community?

Are there better or more practical alternatives available?

4. Mission and Scope

What must be the goals, mission, and scope of the center? On a short term basis? On a long term basis?

Are there geographical constraints?

Who is to be supplied with what services? Who is to be excluded?

5. Resources

What resources would be required?

Facilities?

Equipment?

Materials (including documents)?

Personnel?

Management?

6. Finances

How will the center or the additional service requirements be financed?

Is there a responsible funding source?

Will user charges defray some of the costs? To what extent?

7. Administration and Operations

Is responsible management available?

Are competent personnel and resources available for operation?

Can the needs of the users be rationalized into a conceptual framework of services and resources designed to meet user needs?

Has the design of the center been crystalized into flow charts and block diagrams?

Is there a schedule of implementation?

Have standard operating procedures been developed?

Have relationships with users been spelled out? With other centers? With NCLIS?

Has a charter been articulated?

PROBLEMS

Consideration of the guideposts in planning will be helpful in implementing the information center component as part of the NCLIS program; however, we must recognize that there will be problems, both in the integration and coordination with the program and in achieving viability. Some that might be anticipated include:

1. Relating an NCLIS information center's needs and activities within the mission, scope and operations of existing centers, networks, systems.
2. Integrating and relating with services of conventional

libraries and other information systems and resources.

3. Developing a rationale for achieving a stable and adequate budget.
4. Overcoming barriers to maximum use. (Information centers, even more than conventional libraries suffer from under-use.)
5. Arriving at a basis and system of user chargers (if any).
6. Identifying the complete community of users, determining what they need, and meeting their reasonable needs.
7. Interacting with sponsors and users.
8. Finding, training, and motivating competent staff.
9. Determining operational responsibility in meeting user needs, sponsor requirements, and budget constraints.
10. Obtaining feedback from users.

The indicated problems can be alleviated and some resolved by an articulated charter, tested operating procedures, and a monitoring system.

STANDARDS FOR PARTICIPATION

Standards for participation by an information center in the NCLIS Program are in two major categories: operational and qualitative.

Operational Standards

Basic to the operational standards is the requirement of an articulated charter which spells out as specifically as possible the following topics:

General description of the center;

Mission;

Scope;

Organizational structure, sponsorship and constraints;

Method of operation;

Services, products, and fees, if any;

Definition of users;

Relationship to other organizations; and

Budget.

Important to compatibility, cost reduction, and quality are standards governing input and output. Input standards are needed for:

Acquisition procedures;

Cataloging (bibliographic descriptions);

Classification;

Abstracting and indexing; and

Thesauri (nomenclature).

Output standards cover formats of:

Books and reports;

Journals;

Microforms;

Tapes;

Film;

Audio Visual materials; and

Informal services such as:

Telephone requests;

Letters;

Visits; and

Custom services.

Among other standards required would be those for:

Machine compatibility;

Machine languages and programs;

Statistics and record keeping; and a

System of homeostatic feedback for quality control and self-assessment.

Qualitative Standards

The quality of information services provided by an information center are determined by the following eight performance standards:

Capacity involves the relationship between the resources and scope of a center and the user demands on it. The center needs to be able to collect, store, and process all of the data necessary to develop the information required by its users. It must also have the capability to meet expansion requirements in the data base, in the information/knowledge product, and in the number of users.

Quality has several dimensions. It is related to each of the eight listed standards, as well as to the components of the center, and the center as a working unit. The accuracy and validity of each item and element have a bearing on the utility of the center for the user.

Compatibility is related to the appropriateness of the information/knowledge of the center for its users.

Timeliness is both the temporal relationship between user needs and the center's response time and the time for which its information is valid.

Coherence is the standard related to efficiency. The organization of the information center should be consistent and logical and its components should be integrated to serve user requirements.

Flexibility permits coherent adjustments as user needs or other

aspects of the center's operations change. Inherent in this standard is the capacity to anticipate change.

Dependability allows the information center to perform at given levels of accuracy within given time constraints.

Economy is the cost effectiveness capability of an information center (and is the most difficult standard to measure).

These eight standards serve as a basis for evaluating the performance of a center and can serve as quality control measures.

POSSIBLE STRUCTURE OF NCLIS NETWORK OF INFORMATION CENTERS

Figure 10 suggests a possible structuring of a national network of information centers within the NCLIS program. At present, the diagram is purposely generalized, suggesting relationships but without intent of hierarchy. Appropriate resources meeting the indicated guideposts would be expanded and coopted from existing centers, special and, perhaps, conventional libraries in Federal, state, multistate and local governments, as well as from those in academic institutions and in the private sector. Where feasible, agricultural extension services, field offices of various Federal agencies would be adapted and expanded. New information centers, where feasibility and need were appropriate, would be developed. The program would not emerge full blown but implemented by set stages. There is wisdom in first starting with a pilot program for both coopted, existing information centers and for newly created centers. Each implemented stage would be checked, evaluated, and revised in design and operation as experience and review indicate. Successful

pilot centers might serve as demonstration and training resources.

Of course, periodic reviews should also be built into the operation of the NCLIS Information Center Program.

The NCLIS network of information centers as Figure 10 implies, might include appropriate members from:

Networks of Federal information analysis centers;

Other Federal information centers, resources and systems;

Academic information resources;

Private sector and for-profit information systems;

Regional, state, and local information resources;

Professional society and trade association information systems; and Newly created information centers based in the above and in non-profit organizations.

SUMMARY AND CONCLUSIONS

My purpose in this paper has been to examine the role the information center might play in the NCLIS Program for improving national information services. In order to provide a better understanding of that role, I first identified and defined the various types of information centers and reviewed how information and knowledge are generated, processed, communicated and used in order to show the effectiveness of the center in the information cycle. I then considered how existing information resources might be integrated into the national program and how new centers might be developed. This was followed by an examination of problems to be

anticipated and approaches to be taken to help meet these problems.

What conclusions might be drawn from our examination? It seems clear that a coordination and integration of the information center resources would be beneficial both to the people of the United States and to the information/knowledge producers, processors, and distributors. The NCLIS Program framework can develop rationally, with minimum duplication, with common planning for coverage and services, and with maximum compatibility and establishment of standards.

The NCLIS Program promises the evolvement of the long-awaited rationalized national information system. Within that system, the information center that is now a variously erratic and vigorous component has an important role to play. As we survey the national information landscape, we see there are numerous information centers in operation; they are highly diversified in character content, mission, scope, sponsorship, in method of operation, in services and products and in user communities. Federal, state, and regional agencies have developed or are developing mission-related information centers to provide services to a variety of users within defined categorical areas. Universally, there is a growing realization that information is as much a national resource as are oil and mineral deposits, forests, air, water, soil, energy, communications, and transportation. This realization, that information/knowledge is a valuable commodity, has fostered the appearance of new, privately-sponsored, specialized subject area information services and centers. The growth in informational resources has been uncoordinated, with

unnecessary and costly duplication. Further, despite a growth in information/knowledge resources, large segments of the American population are frequently deprived of necessary and often available information that would enhance their well-being, make their lives richer and their achievements greater.

The NCLIS Program document speaks to the benefits to be derived from its proposed National Program. This paper speaks to the benefits the information center component can provide. First let us look at some obvious benefits. A coordinated program for the development of a Federal, regional, state, local, and private sector network of information centers would:

Encourage existing centers and give them better visibility;

Encourage and develop new centers in areas of national need;

Provide machinery for resolving jurisdictional disputes;

Make available avenues for cost and resource sharing;

Provide a mechanism for continuing reappraisal.

What is less obvious, especially in periods like today -- of depressed financing and constricted government support -- the information center, particularly its most refined and advanced genotype, the information analysis center, should increase in importance because of its theoretical and, at times, demonstrated cost effectiveness. In the crunch of real world economics, the expensiveness of the information analysis center often forces the theoretical to be a lost opportunity.

Yet, urgent social, economic, political, and technological problems in such critical areas as urban and regional development,

health, human resources and their development, environmental problems, food, population control, housing, drugs, mental health, fire prevention, and control of natural and man-made catastrophes require more efficient utilization of knowledge in which the information center could play a strategic role:

Perhaps no better case can be made for the importance of the information center than the observation made in the report by the committee appointed by the Secretary General of the Organization for Economic Cooperation and Development (OECD) that "...the most important event in the next decade will be the recognition of the true value of information, reliable and relevant to our needs, available in useful form to all those who need it." Information, as the OECD document has observed, is the key to the wise management of our future. The information center is a practical means for helping to provide in useful forms the right information, reliable and relevant to all those who need it.

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TABLE I. Comparison of Functions, Products and Service Operations among Types of Information Services Organizations (M = Major Activity, m = Minor Activity, r = Rare Activity, 0 = No Activity)

		Library	Special Library	Documentation Center	Referral Center	Clearinghouse	Information Services/Center	Information Analysis Center
Functions	Collection							
	Document	M	M	M	0	M	M	m
	Data/Information	0	0	0	0	r	M	M
	Processing							
	Document	M	M	M	0	M	M	m
	Data/Information	0	r	0	0	r	M	M
	Storage							
	Document	M	M	M	0	M	M	m
	Data/Information	0	0	0	0	r	M	M
	Retrieval							
	Document	M	M	M	0	M	M	m
	Data/Information	0	0	0	0	r	M	M
	Dissemination							
	Document	M	M	M	0	M	M	0
	Data/Information	0		0	0	0	M	M
	Publication or Reproduction							
	Document	0	0	M	0	M	M	M
	Data/Information	0	0	0	0	0	M	M
	Information Generation							
	Document	0	0	0	0	0	m	M
	Data/Information	0	0	0	0	0	m	M
	Archive	M	M	m	0	0	r	0
Services	Consultation and Advice	r	m	0	r	r	m	M
	Replies to Inquiries	r	m	r	r	r	M	M
	Referral	r	r	r	M	M	m	r
	Retrospective Search	m	M	M	0	M	M	r
	SDI	r	m	m	0	m	m	r
	Serves Visitors	M	M	0	0	r	m	r
	Conducts Seminars and Conferences	m	m	0	0	0	m	r
	Conducts Research	m	m	0	0	0	0	m
	Translation Services	r	m	0	0	r	m	r
Products	State of Art Reports	0	0	0	0	0	m	M
	Critical Reviews	0	0	0	0	0	0	M
	Critical Compilations	0	0	0	0	0	0	M
	Handbooks	0	0	0	0	0	m	M
	Bibliographies	0	M	M	r	M	M	m
	Data Sheets	0	0	0	0	0	m	M
	Current Awareness Bulletins	0	M	r	0	M	M	m
	Periodicals	r	m	0	0	0	m	r
	Abstracts	r	m	r	0	r	m	m
	Indexes	0	m	r	0	r	m	r
	Newsletters	r	m	m	m	m	m	m
	Film	0	0	0	0	0	m	r
	Directories	r	m	0	M	m	m	r
	Translations	r	r	0	0	r	m	r
	Thesauri	r	m	r	0	m	m	m
	Recommendations	0	0	0	0	0	m	m
	Correlations	0	0	0	0	0	0	M
	Accession Lists	m	M	M	0	m	m	r
	Conference Proceedings	0	0	0	0	0	m	r

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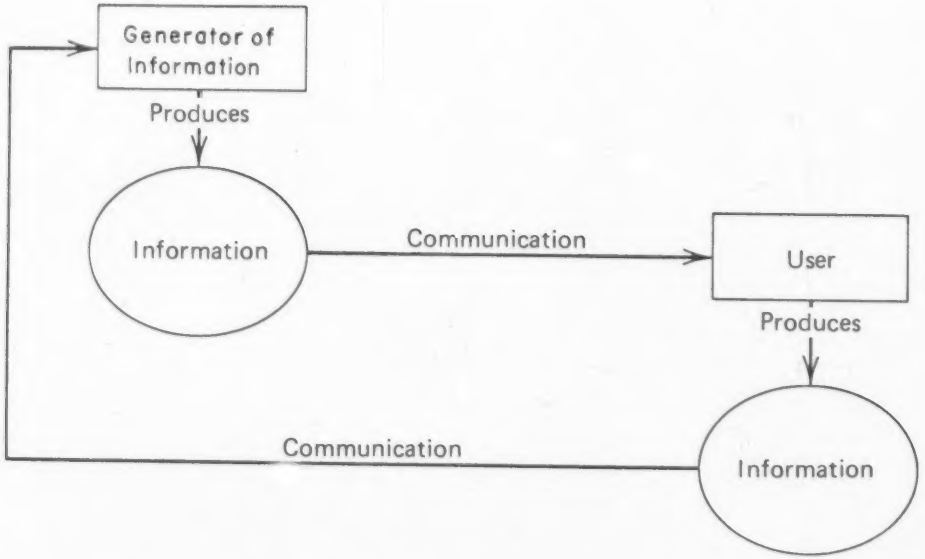

Figure 1. Basic, simplified information system.

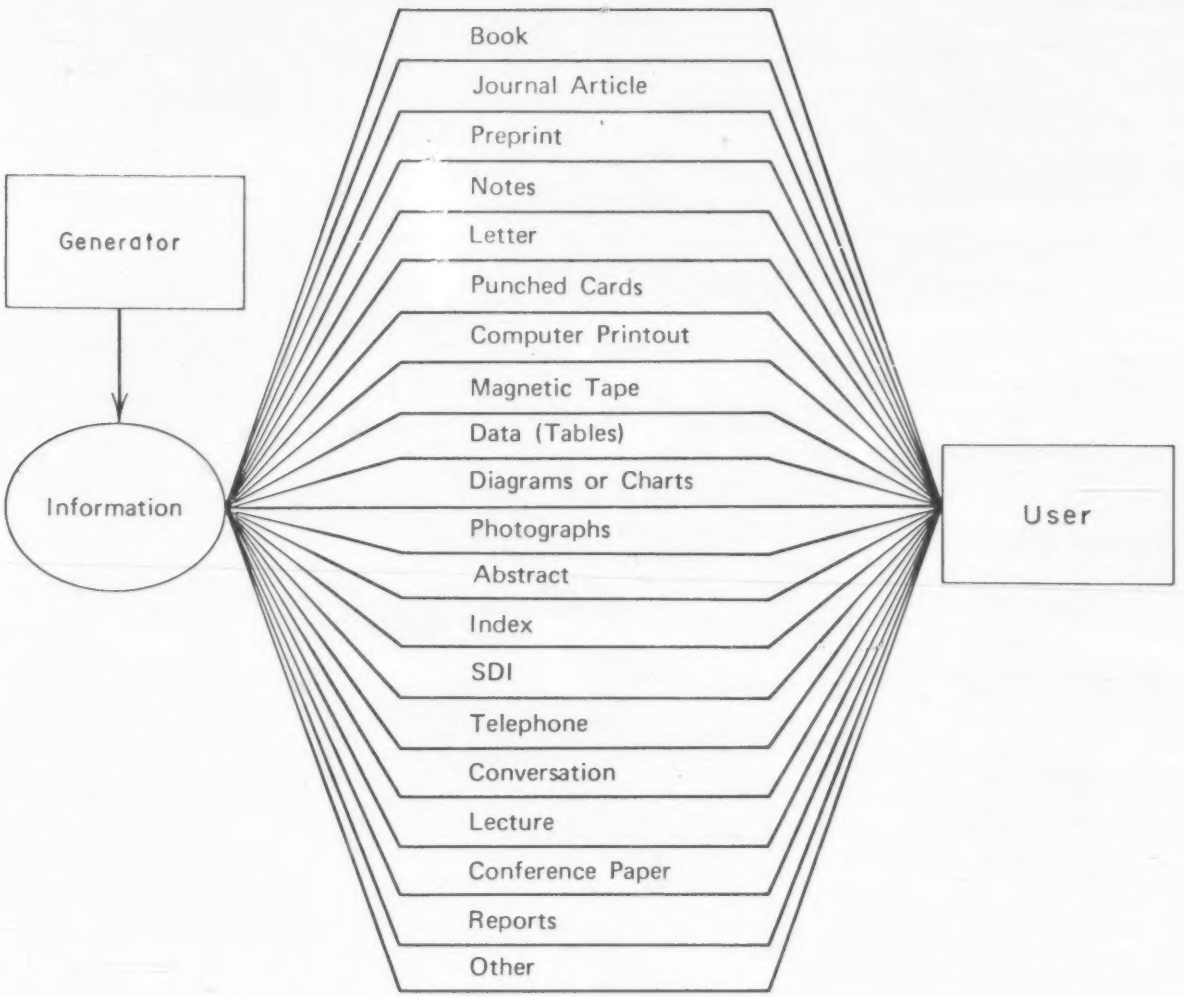

Figure 2. Multichannel communication media of the information system.

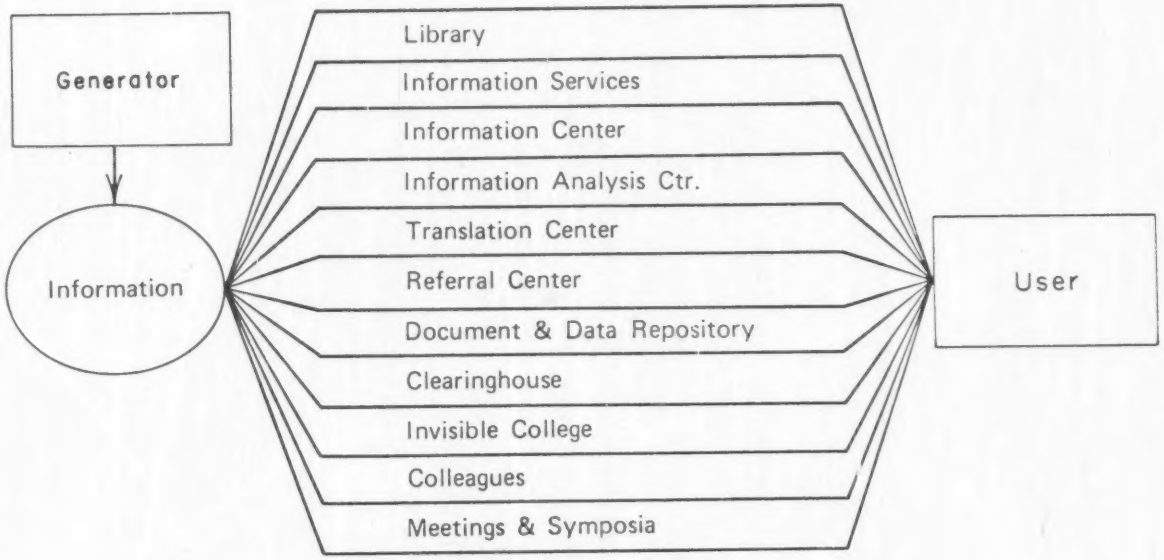

Figure 3. Intermediary information sources.

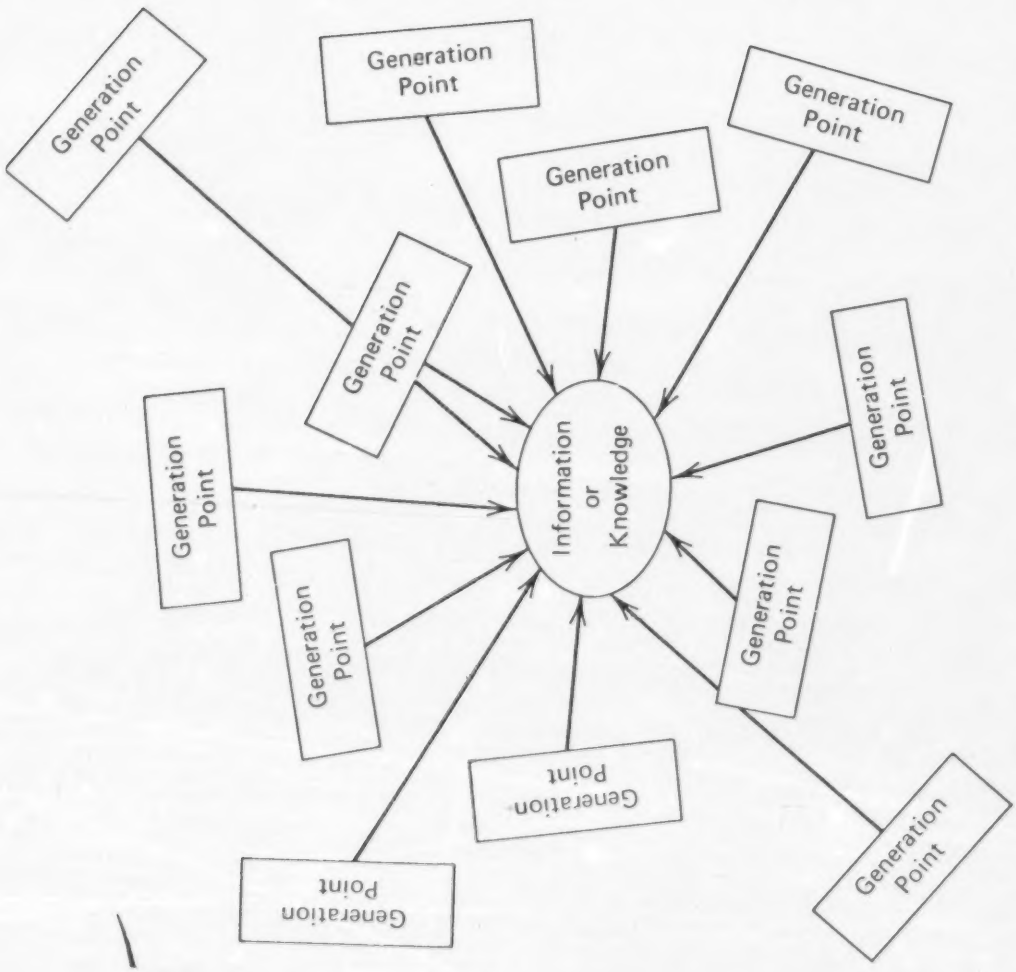

Figure 4. Generation of information or knowledge.

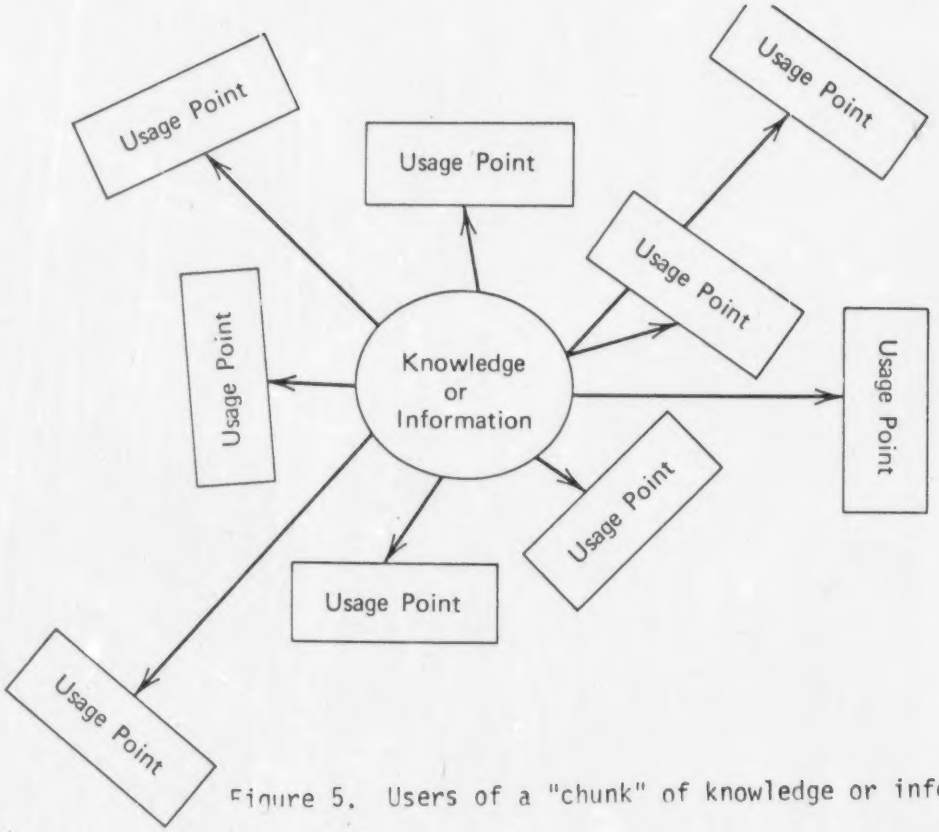

Figure 5. Users of a "chunk" of knowledge or information.

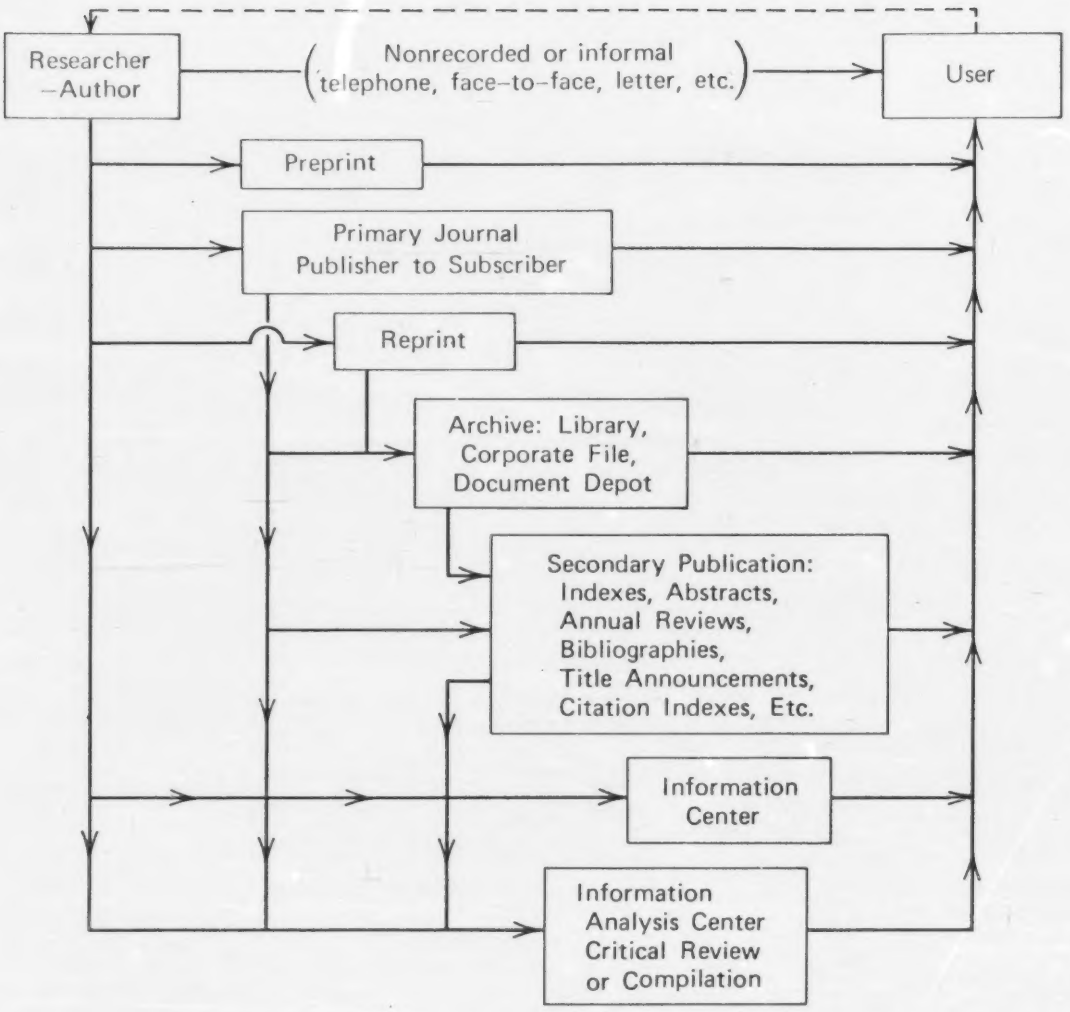

Figure 6. Various mechanisms of disseminating generated information.

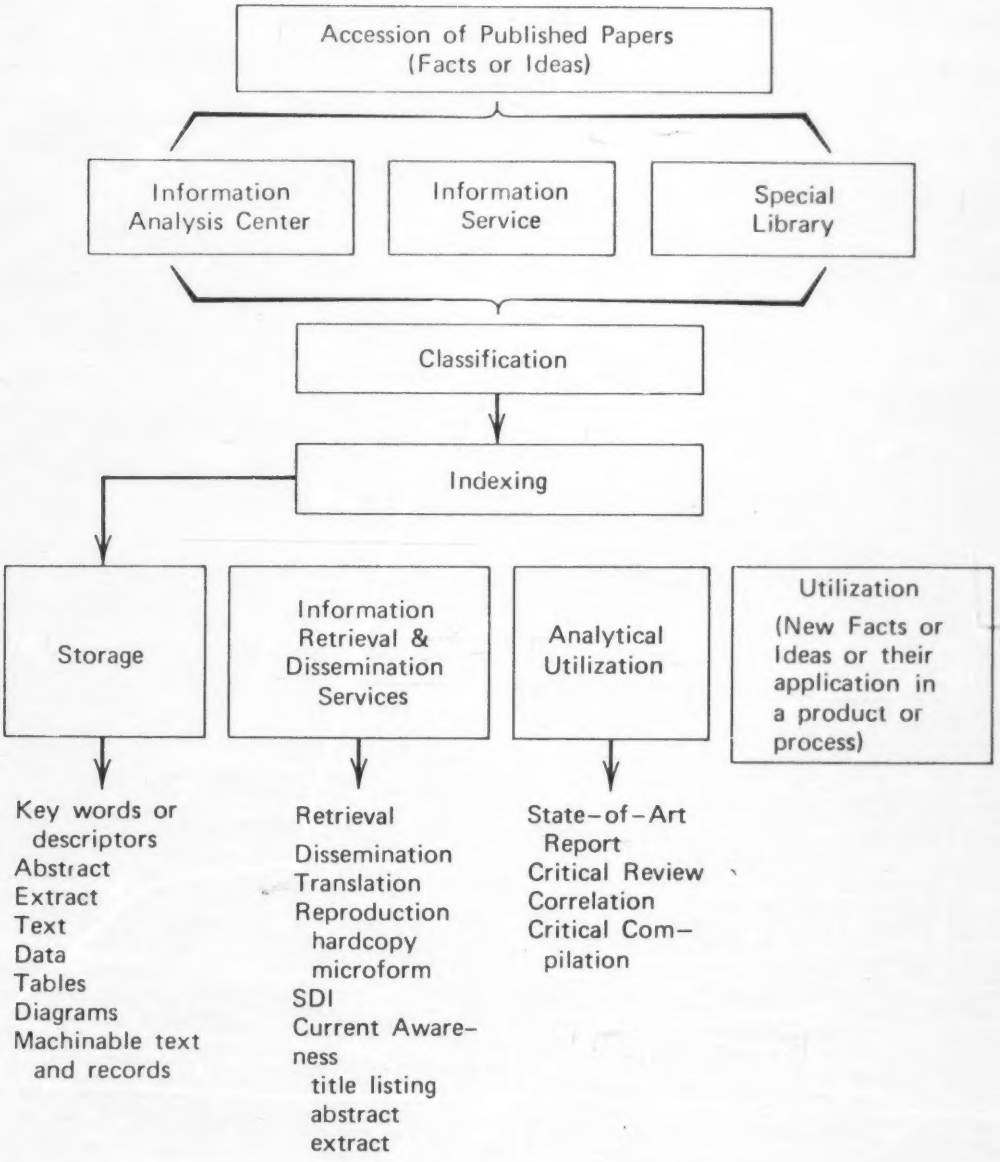

Figure 7. Information flow in the utilization process.

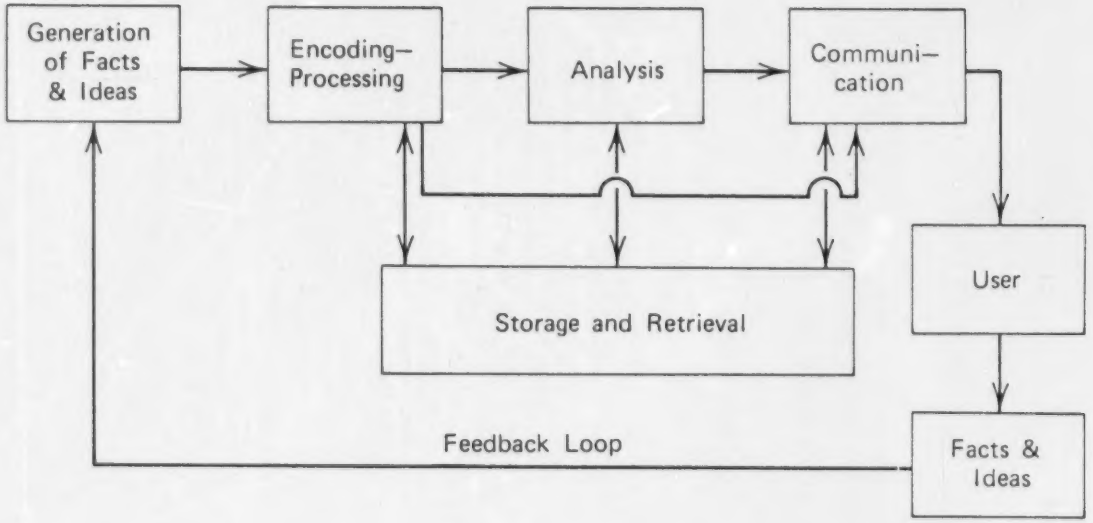

Figure 8. Conceptual structure of the generalized information system.

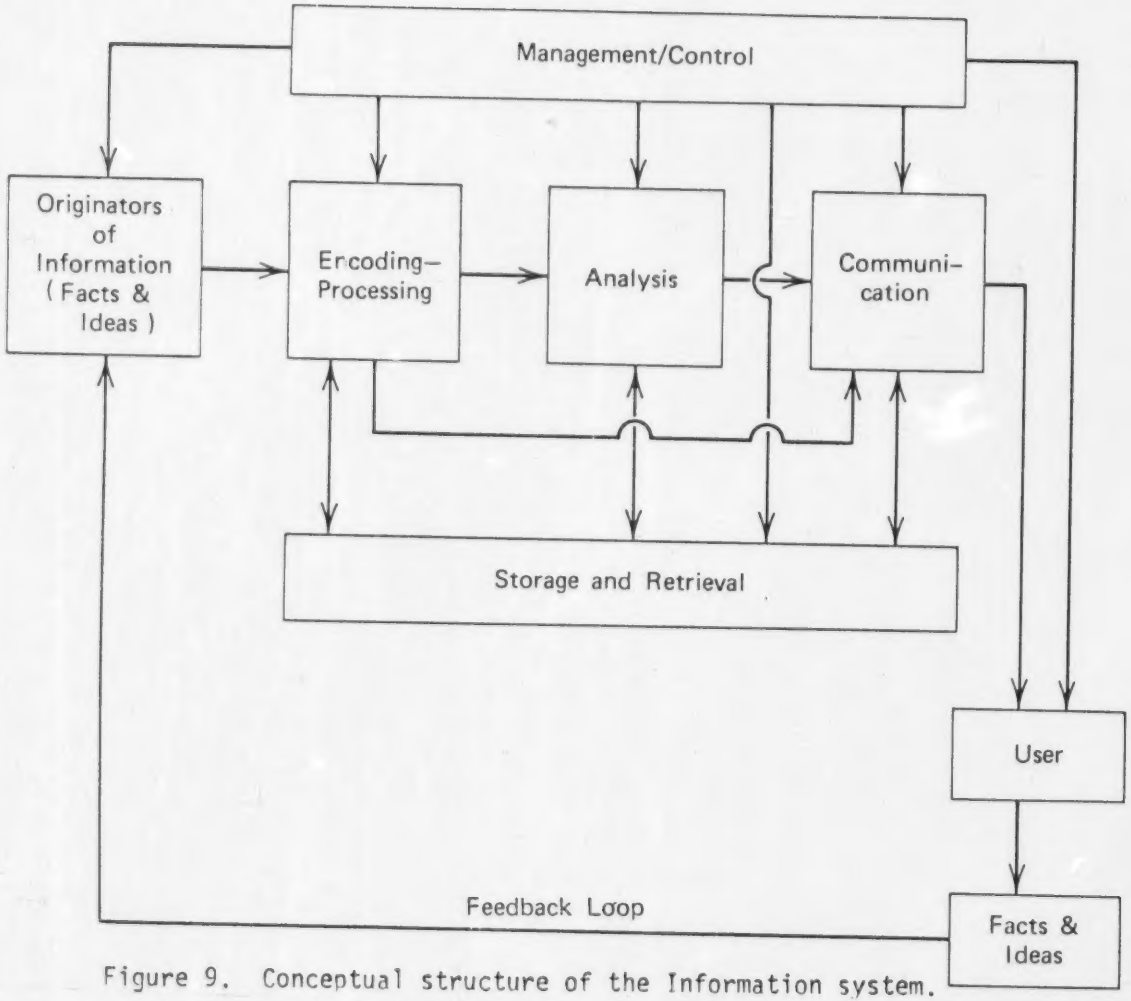

Figure 9. Conceptual structure of the Information system.

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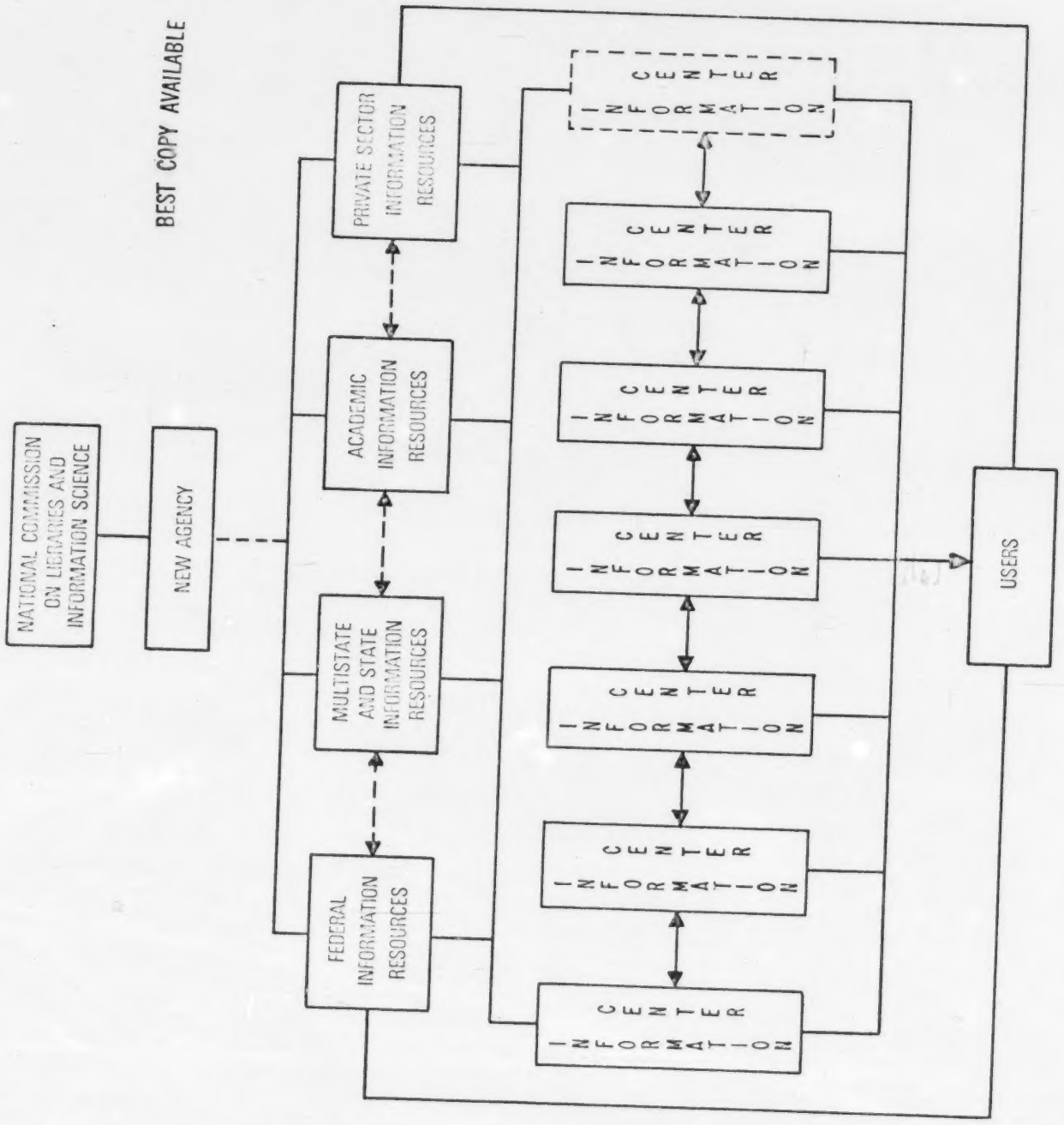

Figure 10. Generalized Structure of a National Network of Information Centers within NCLIS Program